Harnessing a Knowledge Worker's Competency: Lessons from the Software Development Teams

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ABSTRACT

In this conceptual paper, we propose that the work force can no longer be understood only as a factor of production, but must be projected as a strategic core competency of any organization. The "knowledge-based", post-industrial economy has lead to a higher degree of pressure on the corporations to nurture and enhance their key strategic resource viz. the Knowledge worker (K-worker). Based on the resource based view and firm strategy, we hereby define the core human competency of the K-worker as a firm specific, rent-generating resource manifested in the behavior pattern of its employees that is aligned with a firm's core business activities. Besides, our literature survey of the software developer's field suggests the key business imperatives of future orientation, customer orientation, team work, problem resolution and quality. Hence, these five are hypothesized as the key human competency determinants of a software developer or a K-worker. Thus, our novel approach presupposes that the human competency grows with and around the key business activities of a business organization. The utility of this approach is projected through the lens of the systems view via the fifth discipline and integrated with the quality management practices to build a bulwark for the nurturing of human core competencies. At the heart of this systemic thinking is a shift of mind better termed as "metanoia". We thus emphasize that k-worker management needs a more individualized and customized appreciation unlike what has been the norm so far. This strategic human competency approach is then the crucial ground for a learning enabled organization of the future that is struggling under enormous pressure of competition in today's landscape.

KEY WORDS

Competencies, Knowledge Workers, Software Development Team Professionals, Systems View.

1.0 INTRODUCTION

The employee as a knowledge worker is increasingly recognized in the IT industry. It has been an emerging area of research in the Information Systems literature (Davis, 1999). Before proceeding any further we need to address what is an "IT worker" as a key artifact of the knowledge work era. An IT worker is an organizational employee responsible for designing, building, testing, maintaining, and operating organizational applications and infrastructure. Such IT workers are characterized by high turnover rates as they are being wooed away by the private sector in droves resulting in fierce marketplace competitiveness for staff. In general, our global, knowledge-based, postindustrial economy is made up of knowledge organizations that have migrated form a job-description based, task-oriented workforce to one in which knowledge workers occupy broader roles that may change over time as projects change, evolve, and develop. The rapidity of technology change demands different skills from the employees than ever before in the past. In such a context, determination of relevant competencies becomes inimical to the success of tomorrow's knowledge workers in knowledge-intensive organizations. Besides, its crucial to understand the engineering of the individual consciousness shifts to make such a competency initiative work for these knowledge workers. Much of the support for the knowledge work productivity consists of enabling technology, enabling methods and procedures, and organization culture that transmits "how things are done". Interestingly, there is little or no research to distinguish the competence led strategies of the more productive workers

vs. the rest of the staff in the literature. (Davis & Naumann, 1997).

By virtue of the following paper we highlight the meaning of competencies in a k-worker era. We follow this with a literature lead review of a k-worker competency in the IT context. This is followed by the ubiquitous systems frame of competencies that would enable the knowledge organizations at large to monitor their human resources and create value through them.

2.0 LITERATURE REVIEW OF THE TERM COMPETENCY

Although the competency theories are scarce, there is ample evidence in the literature of attempts to explain the term "competency". As per the review of the competencies' literature, there have been two approaches to identify the meaning of the term "competency." Boyatzis headed a research in the 1970s, initiated by the American Management Association to find out what makes the managers competent. This approach led him to believe that the "competencies" is a general term for the skills that are and can be deployed by the managers to accomplish their assigned jobs. These few skills are best learned by practice that takes place on the job. Boyatzis (1982) had built on this research in his classic model, which is an adaptation of the classical psychological model of behavior. According to him, behavior is determined by the person and the environment. Both the gurus of the human core competency define it as an "underlying characteristic causally related to superior performance in resonance with its environment". The other approach was based on a study by the UK Government Employment Department asserting that the term "competency" has a wider implication than just the attributes of jobholders. Instead, the approach identifies the outcomes expected from a job when it is performed adequately. It suggests not only skills and knowledge but also the range of qualities of personal effectiveness to get the job done. In keeping with the second view, McClelland (1985) first broached the topic of superior performance by individuals at a specific job. This he attributed to the term "competencies" by which people in any organization can be evaluated and assessed to predict their performance.

Further literature review presents a wide array of studies on the subject of the individual competencies to perform a given job effectively. Additionally, Spencer et al. (1993) further define competency as an underlying characteristic of an individual, causally related to criterion-referenced effective and/or superior performance in a job. Further to that, William Rothwell, (1989) the leading practitioner of competency and competency mapping techniques describes it as the internal capabilities that people bring to their jobs. The above authors define competencies only as a subset of the employee competence at work Moreover their definition is lacking in the visible behavior aspect of an employee that we wish to study and define.

We will try to explain competency more on a dynamic behavioral pattern of a set of activities that an individual performs to stay effective in a given context of his job in an organization. At this stage it might be interesting to mention that the competencies have also been characterized by a set of behavior patterns, but have yet to combine the strategic orientation to them. For e.g. the behavioral perspective has led writers and firms to compile profiles of generic competencies and to relate these to performance (Spencer and Spencer, 1993). The compilation of a set of personal characteristics as competencies has been criticized in the earlier said literature and we set about to move beyond the concept of competencies to the firm's core competitiveness which are the "roots of competitiveness" (Prahlad and Hamel, 1990). This facilitates the combination of the strategic and behavioral competencies which Sparrow (1994) contends is the most appropriate competency approach.

Grant (1991) observes that the rationale for basing the firm's long-term strategy on its resources and capabilities rests on the premise that the resources and capabilities provide the basic direction for the firm's strategy, and that they are the primary source of profit for the firm. Hence, we can argue that to the extent the human resources are at the heart of organizational process, they are a potential root of competitiveness. Also, significant is the contribution of Nordhaug and Gronhaug (1994) who also see human competency as a critical resource for competitiveness especially where competencies are treated as a portfolio configured with regard to a firm's value activities. Thus, the significance of analytical and cognitive abilities, interpersonal and social skills derives from their association with the core services/activities. In practice this means that managers should be able to relate behavioral profiling not merely to the job but to the core business activity.

The advantage afforded by the more successful employee's competencies can be replicated throughout a business. Thus, one manager will be more successful in a certain role compared to his/her peers because his/her set of competencies are more suited to the functions required of him/her in that position. The human competency is thus an aspect of business by which we define what we can do best. It's a core capability that is dynamic to the extent that it won't be imitated by any employee as it's a function of dynamic learning processes or continual practice that feeds it at all times.

3.0 THE STRATEGIC HUMAN COMPETENCE FRAMEWORK

Human resource management theorists applying resource-based lenses have highlighted the advantage-producing traits of human capital (Castanias and Helfat, 1991) e.g. top management expertise has been described as a rent-generating firm resource. In contrast to generic skills which are easily transferable between uses, industry - related and firm-specific managerial skills may generate quasi-rents. Both, however, may produce Ricardian rents because they are scarce and difficult to duplicate perfectly.

No matter how much one understands about the mental processes, structures, and representations that

underlie cognitive performance, intelligence cannot be fully grasped unless one understands how it is applied in the everyday world (Warr and Conner, 1992). A theory of intelligence must ultimately reflect the capability of emitting contextually appropriate behavior, which includes the utilization of tacit knowledge (Sternberg, 1985). Therefore, the rent-generating features of intelligence cannot be assessed in terms of psychometric scores that measure problem solving and verbal abilities alone; they must also be assessed in terms of practical competencies. These also reflect tacit or intangible knowledge which are not easily duplicated or substituted (Hall, 1993; Reed and DeFillipi, 1990). Also, practitioners of intelligence have highlighted the fact that traits like intelligence are fundamentally irrelevant for determining the individual differences in acquired expertise (e.g., Ericsson et al., 1993) To explain sustained competitive advantage and supernormal profits, the resource-based view (RBV) focuses on the characteristics of three types of resources viz. physical capital, human capital and organizational capital. These three types of capital form the mainstay of and strategy and RBV related theory.

We focus on the last two resources for studying the human competence at work. This implies the static human resource of skills, knowledge changes in compliance with the organizational routines.[1]The resultant is closely aligned to firm's business activities. Thus, we may point out that rent-generating feature of resources is manifested in the K-worker's strategic competency.

3.1 Competency of a K-Worker Defined

Hence, we define the human competency as follows:
A firm specific, rent-generating, critical resource manifested in the behavior pattern of its employees that is aligned with a firm's core business activities.

Having arrived at a workable definition of a K-worker, we strive to present a research lead gap in K-worker study in the information systems (IS) discipline. IS discipline can be as a starting point for the studies on the K-workers as discussed earlier. Thus, we present a literature review of the recent spate of researcher's skills based approach to managing K-workers. We argue that a skill base approach to K-worker ignores the organizational strategic activities. Hence, we follow this with a literature review focused on the latest knowledge-work organizational form viz. the software development teams. This is instrumental in explaining the key competencies requisite by a k-worker in the given context.

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[1]The resource classification as per the RBV is as follows:
a.) *Physical Capital*, which includes the physical technology used in a firm, its plant and equipment, its geographical location, and its access to raw materials;
b.) *Human capital,* which includes training, experience, judgment, intelligence, relationships, and insight of individual managers and workers in a firm; and
c.) *Organizational capital*, which includes a firm's formal reporting structure, its formal and informal planning, controlling, and coordinating systems, and informal relations among groups (Barney, 1991).

4.0 LITERATURE REVIEW OF K-WORKER'S IN THE INFORMATION SYSTEMS

In the past, several studies have been the cynosure of the knowledge and skill requirements of the IS personnel (Baroudi, 1985; Bryant, 1975; Cheney, 1988; Cox and Snyder, 1985). These researches drive home the point that there needs to be still more refining done in the IS professionals generic requirements in a work environment which change with passing time (Baroudi, 1985; Cheney, 1988). The studies conducted in the 1980s indicated a growing need for IS personnel to have functional expertise (Cheney, 1988) so that they may be able to freely consult the end-users too.

Recent spate of research on the skills of IS professionals tends to focus on soft skills irrespective of totality of skill vs. competence set required by them (Lee, Trauth, Farwell, 1995; Nelson, 1991; Todd, McKeen & Gallupe, 1995; Trauth, Farwell & Lee, 1993; Wade & Parent, 2002). It can be inferred (Table 1) that the area of human competencies has gone unresearched so far owing to the focus on IS professional's knowledge and skills alone. Moreover, specific studies have been done on the skills of web-designers and web masters (ex. Sgobbi, 2002; Wade & Parent, 2002), but so far no research has been done on the core competencies of a systems professional in the context of ubiquitous phenomenon software development teams. Also, most of the works discussed so far have captured (refer Table 1) IS professionals' knowledge and skills in the form of organizational and technical skills alone. The exception is the Trauth et al. (1993) article that focuses on an additional component of human & technical ability also in addition to the skills profiling.

It can noted that these workers on the IS or K-workers have focused specifically on the skills as a static resource independent of organization in which they would be deployed. This then forms the crux of our competence framework wherein we would attempt to highlight the application based K-worker competencies.

4.1 Core activities in Software Industry/teams

This is the first initiative to make a workable measure of the key competency areas of software development professionals operating in a team environment. . Thus in a novel approach to this knowledge based search for individual competencies, we provide the key strategic business activity dimensions as identified in the literature. This then forms the basis for the present study.

The literature review of the software organizations reveals that there are few core business imperatives around which these organizations flourish. Based on our analysis from the literature so far, we are hereby proposing a framework to understand what it takes to convert a skill set as a resource into a dynamic human competence capability aligned with the business imperatives in the software development industry.

Thus, we establish the key competence areas of these firms that enable its human resources to align their

competences around these core business activities. The following is thus the definition of the five highlighted business lead core human competency areas

4.1.1 Futuristic Orientation Competency

This implies the business processes of the software development team that require its K-workers to learn new technologies, languages et al. For this the software firms initiate collaborations with Microsoft, ORACLE, Novell et al corporations to train their K-workers/ engineers on future technologies. Besides, with outsourcing projects on the upswing the K-workers are trained to be multi-lingual with multicultural awareness for probable future projects. Thus, we see that these firms have built-in system features

that preempt the programmers or K-workers in their field to develop these futuristic orientation competencies

4.1.2 Problem Resolution Competency

The software developer's world is forever fraught with complex situations. These then could be related resolving the system analysis and design, deciphering the right code, finding the right fit between complexities of output vs. its multiplicative features. This entails debugging, troubleshooting et al resolutions. Sometimes the issues in customer solution crop up post implementation, wherein the know-how of code formulators is needed. Who might have been assigned a different duty. This implies a problem situation of getting across to them and resolving the pending customer issues. Further, the customers might

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Table 1:   **Recent Research on IS developer's profile**

Recent Studies on IS/K-Worker	Construct Studied	Sub dimensions of the Construct			Methods	Sample Unit	Key Findings
		Technical	**Organization**	**Human**			
Wade and Parent, 2002	Skills	√	√	-	Job-content Analysis and Survey	Web masters	Empirical link between job skills and job performance
Lee, Trauth and Farwell, 1995	Knowledge and skills	√	√ (Business operations, management & interpersonal)	-	Focus Groups and Delphi Surveys	IS and User managers	Requirement of IS professional with both technical as well as organizational skills
Todd, McKeen and Gallupe, 1995	Skills	√ (Technical and systems)	√ (Business)	-	Job-content analysis	System analysts and IS managers	Systems analysts job requirements show maximum transition with increasing requirement of technical knowledge
Trauth, Farwell and Lee, 1993	Skills	√	√ (Business abilities)	√ (Human ability)	Brain storming sessions, telephonic interviews and focus groups	IS managers, end-user managers, and IS professors	An expectation gap discovered between industry needs and academic preparation of the future IS professional
Nelson, 1991	Knowledge and skills	√ (General IS knowledge, IS product and technical)	√ (Organization skills & knowledge)	-	Focus groups and survey	IS and end-user personnel	IS personnel need more organizational knowledge End-users require more IS-related skills

present critical issues from time-to-time, requiring attention. This implies knowing the organizational structure, its hierarchy, and facilitating persons for a particular issue in the network. Thus, all these facets of a fast paced knowledge organization enable the problem resolution competency development of a K-worker

4.1.3 Quality Approach Competency

The software industry is crowned with a host of quality related accreditations and awards that need to be adhered to. This instills in the K-workers the ethics of quality work. Moreover, this implies the precision in code writing, the minimization of bugs in code et al. The real-time incorporation of dynamic code requirements from the customer's vantage point is another example of quality work ethic. Thus, we may see from these examples how the quality competency becomes incorporated in the profile of a K-worker.

4.1.4 Group Orientation Competency

The work in this knowledge era is more demanding group-wise i.e. there is more dependence on work groups and teams to get the jobs accomplished. The software development team is an example of such a work culture. Thus, we see a lot of attention paid to peer-to-peer networking, conflict resolution mechanisms, delegations, negotiations et al group mechanisms. This makes the K-workers resolute to work cooperatively in large and small teams, thus instilling in them what is termed as the group orientation competency.

4.1.5 Customer Orientation Competency

The last but not the least, as is well known is the care of the customers. The knowledge work in the fast paced software industry is increasingly client focused. This requires working even on the weekends or public holidays if that is what the client requires. For a K-worker this means showing initiative, enthusiasm and motivation for serving the customer. The K-worker needs to have domain knowledge and corporate know-how of the client to be on the top of any critical situation. Thus, K-workers are called for value-adding to their custom-tailored solution for each customer. This instills in them a key competency of customer orientation.

Hence, above are the key competency areas for a software programmer and a typical example of twenty-first century K-worker. These key activities are the summarized as the core competence areas of these organizations (refer Table 2). We can thereby utilize this knowledge to develop frames for understanding individual competency levels on each of the above dimensions. Then we may enhance the K-worker competency and bridge the competency gaps based on the following insights from the Peter Senge's Fifth Discipline (1990).The following is a prescriptive section for the human resource practitioners in the K-era.

5.0 MANAGING K-WORKER'S COMPETENCY: A SYSTEMATIC APPLICATION OF THE FIFTH DISCIPLINE

The characteristics of organizational systems, which include complexity, internal dynamics, and intransperence, ensure incomplete or incorrect understanding of the system. As people perform, they create performance systems which can be seen as the outputs of their competency measures. These then present constraints to and opportunities for future choices. It can be noted that people as dynamic entities create continuously evolving performance and competency gaps. Besides, the intransperence of organizational systems caused by system complexity and internal dynamics result in inclarity about performance improvement situations. This implies incorrect understanding of the system in which an individual may plan, decide, and take action to fulfill his and his team's aspirations.

Today, the learning organizations are those where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together. (Senge,1990).The distinguishing feature of a learning, knowledge-oriented organization is the art of converging the five disciplines of systems thinking, personal mastery, mental models, building shared vision and the team learning. Thereby, we propose to view competencies of the workforce via this lens of the Senge's five disciplines. The ensemble of five disciplines is mutually dependent .

5.1 Personal mastery

The first discipline of personal mastery is the most alarming signal for an organization without which any understanding of an employee is not possible. Personal mastery's spiritual foundations are clear as the discipline of continually clarifying and deepening our personal vision, values and objectivity. To tap the reservoir of employee creativity, personal mastery starts with clarifying the things that really matter to employees in the workplace. In order to serve their highest aspirations, the members of the software development teams (SDT) need to be aware of the relevant benchmarks i.e. what works best! This is where a competency profile generation of the software professional would shed light on the trends in the much sought after profession today. This would guide the professional development of each and every employee in a SDT. This forms the basis for much research work into software professional's skill field (Lee, Trauth & Farewell, 1995), as this moves beyond acknowledgement of valuable human resources to setting standards for effectively harnessing it. This would then form the basis for any employee development program enlisting a more genuine and comprehensive of system's development professionals.

Table 2:   **The Five Key Business Activities of the Software Organization**

Sr.No.	Topics covered	Cited Literature	Key Business Activity
1.	Quality Processes viz. documentation,SEI-CMM level5, PCMM level5 optimization et al.	Boehm and Egyed(1999);Meredeth(1985); Robinson and Ringer(1999) ;Tomek and Giles(1999)	Quality Approach
	Conflict Management and buffers to social interactions	Gobeli,Koenig & Bechinger(1998); Sawyer(2001);Sawyer, Farber and Spillers(1997); Sussman and Guinan(1999);Zachary(1998)	Group Orientation
3.	Comparisons to New Product Development teams vis-à-vis lab experimental groups	Mcgrew, Bilotta and Deeney(1999); Nambisan and Wilemon(2000)	Group Orientation and Quality Approach
4.	Initiation, assignment, integration and work outcome	Ang and Slaughter(2001); Badiru (1998); Hahn, Jarke and Rose(1991); Smith, Hale and Parrish(2001)	Quality Approach, Customer Orientation, Problem resolution and Group Orientation
5.	People oriented studies	Faraj and Sproull (2000); Krishnan (1998); Middleton(2000); Ormerod(1995)	Future Orientation, Customer orientation and Quality Approach
6.	Packaged software vs. in-house development teams	Carmel and Sawyer(1998)	Group Orientation
7.	Team Productivity and Performance	Ancona, Bresman and Kaeufer(2002); Andres(2002); Henderson and Soonchul(1992); Sawyer and Guinana(1998);Sahni, Sena and Stebbins(2000); Sonnetag, Frese, Brodbeck and Heinbokel(1997)	Group Orientation, Future Orientation, Problem Resolution and Quality Approach
8.	Project management skills and related variables	Ball (1985); Boehm and Ross(1989); Carragher(1985);Sweet(1985);Taff, Borchering and Hudgins(1991)	Future Orientation, Quality, Customer Orientation, Problem Resolution and Group Orientation
9.	Interdisciplinary and Cross-functional teams	Dube(1998); Johnston(1984);Whitfield(2002)	Customer Orientation, Group Orientation and Problem Resolution
10.	Effective time and project deadline management.	Blackburn and Scudder(1996); Meilir(1985)	Quality Approach and Problem Resolution
11.	Use of Decision Support Systems in team management.	Diprimio(1984)	Quality Approach and Group Orientation

5.2 Mental Models

We proceed further to the second discipline, which is that of mental models that are instrumental in effecting human behavior. It is concerned with an individual's insight into his "self" which may be only enabled through openness to inquiry and learning. Again, in the perspective of the software industry, it's not far from truth as people learn to manage themselves all the time. But, still certain organizational interventions like assessment centers and training & development can be crafted to enable an individual self's growth and learning.

The effort should be meant to lead to intrinsic upliftment fulfilling self-awareness and self-actualization needs. An example could be the training interventions directed towards raising individual as well as collective consciousness like transcendental meditation techniques. Moreover, the proponents of transcendental approach consider quality and high competence as synonymous with "innate excellence". Scientifically then, such interventions have been proven in some key organizations and industries across Europe and the United States. The global K-workers can benefit too from this intervention once rightfully conceptualized and administered. Thus, to make many organizational changes and practices meaningful for each employee it becomes necessary to involve their tacit mental models as a useful tool.
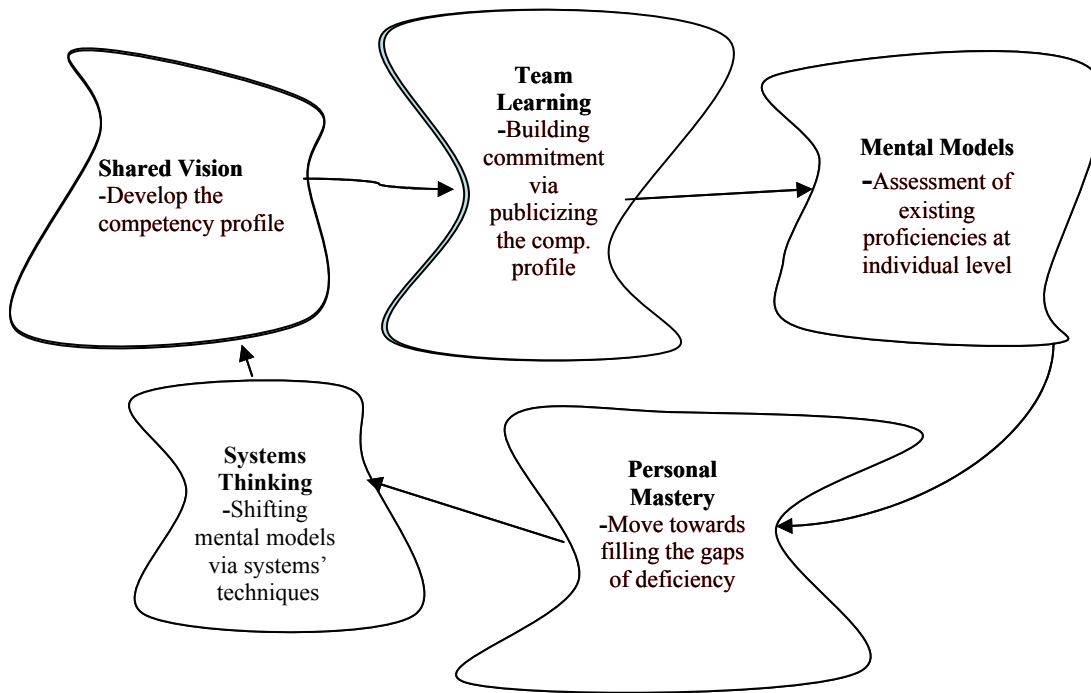
Figure 1:   **Application of Senge's Five Principles to the Human Competency Management**

5.3. Shared Vision

The third discipline concerns itself chiefly with the building of this shared vision. All successful organizations deeply share their goals, values and missions with their employees. What then would be required would be a shared vision of the commonalities in the software developer's community by virtue of their competency goals. This would help in binding them together through a common identity and destiny despite their indisputably different selves and orientations. This practice of sharing competency measures would involve the skill of mentally shared "pictures of the future". This in turn fosters genuine commitment and enrollment rather than the dictates of compliance

5.4. Team Learning

The fourth discipline is of team learning, that in turn abets organizational learning. This is not possible in the absence of shared vision and goals. All organizational members learn to respect and internalize the common competency goals of the group. Noteworthy is the fact that the resulting capacity and the intelligence of the team would be far greater than its individuals' total.

5.5. Systems Thinking

The systems thinking, the last of the above five disciplines, considers business and other human endeavors as systems (Senge, 1990). We as human beings are apt to focus on the snapshots of isolated parts of the system alone. In the process, we may fail to take cognizance of entirety and reality of a situation, which results in a parochial view of any crisis situation. Hence, the solution lies in the systems thinking, whereby we mean a conceptual framework that makes the patterns and events clearer. This enables us to manipulate the reality that brings about requisite change. Taking the instance of the K-work in the software development teams, it is often recorded that the personnel are subjected to the ubiquitous job related training programs that are generic in nature. The need is to treat each employee as an entity embedded in the environmental system of the organization and with a specific mental model. The need is then to produce" metanoia" or the shift of the mind of its employees to result in enhanced competency via above mentioned techniques. This is pertinent since the systems' thinking is needed that believes in every employee as a distinct stakeholder in the organization. This would certainly imply that each K-worker differ in its training and developmental needs. This view is supported by the Resource Based View (Barney, 1991) which values each employee as a potential resource base that needs individual nurturing rather then being considered as another faceless cog in the wheel.

All the above-mentioned disciplines enmesh to provide significant competency-lead team learning resulting in smoother coordination and cooperation within these sub-groups (refer Figure 1). Thus, we make a significant contribution to the much needed research on the quality of the K-workers in a K-organization like a software development team.

6.0 IMPLICATIONS

The critical perspective of social constructivist approach considers quality as being constructed through the accounts provided by various powerful agents i.e. a product/professional is held to be a quality product/professional not because it is inherently good, but because it has been adjudged good by those in a position to bestow or recognize quality in the product/professional viz. the customers, the top management, a standards certification body etc. (Kelemen, 2003). This approach justifies the rationale for focusing on the much-acclaimed competence of the professionals in the competent and successful organizations in the software development industry. The management of the human resource via these core competencies impacts on the competitive advantage in the firms, through its role in determining the skills and motivations of the employees and the cost of hiring and training them. .

With the software development industry getting crowned with the host of quality certifications and awards at organizational and customer satisfaction level, it is necessitated to view it from the third eye-the eye of their professional's quality. Noteworthy is the finding that almost two third's of organizational value is perceived to be intellectual and that half of this intellectual capital (IC) value is perceived to be from the people dimension. But, still the theories in this sense of IC management are scarce. Thus, filling these gaps in knowledge requires the development of mid-range theories; theories where general frameworks are available but lack domain specific operationalizations.

Moreover, it has been noted that the alignment of human resource practices with the philosophy of quality requires significant changes in the way organization trains, empowers, evaluates and rewards individuals and teams. Most quality programs rely on the use of Human Resource Policies to encourage employees to embrace both standardized and continuous improvement tasks so as to generate employee commitment. Interestingly enough, the need for employee commitment and involvement to the goal of quality has not been explicit in the work of the quality gurus. For instance, Deming's quality philosophy focused only on the changes management has to make and Juran's quality ethics mentioned employee involvement only superficially. A study of quality award winners in America (e.g. Xerox, Motorola) suggest that the integration of Human Resource Management and quality management practices in these companies has apparently lead to reduced costs, increased product reliability, greater customer satisfaction and shorter product life-cycles. The requirements of the software process maturity models termed as Capability Maturity Model (CMM) are unique in the sense that they show that information systems professionals working in large teams must be capable of being highly productive with strong emphasis on process control and overall quality. The quality practices of continuous improvement when applied to HR would rely on the generation of objective data like facts that are perceived true and can be used to promote and systematically improve the work processes of people. In the software industry, people management practices although significantly studied, do not address people issues in a systematic and structured manner. Hence, this study brings attention to human resources with a focus on the competencies of the K-worker's in the software industry.

7.0 FUTURE RESEARCH DIRECTIONS

This study can be designed to be a precursor to a more empirically driven formulation of core competencies of a K-worker in a software development environment or in another K-worker arena. Further, we may develop a cross-cultural understanding of the variations in the profiling of a K-worker's competencies. Besides, the K-worker management needs to reach new, improved heights by the systems view application as outlined in this study. An empirical validation of this in the real-world via a case study approach would further strengthen our framework. Thus, the strategic human resource management would tremendously benefit from this study in this era of businesses outgrowing national boundaries

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